In my book on *Ways of Knowing: A New History of Science, Technology and Medicine* (2000), I showed how a model developed from the historiography of medicine could be used to elucidate much wider histories. Since then I have published several papers refining my framework and extending its scope.¹ In June 2012, after a lecture in Utrecht, I was asked how my method might be used for the history of the humanities. This paper sketches a response.²

But why should I presume that I have something to contribute to the 'history of the humanities', especially since this category has rarely been considered by historians in Britain? Even if we agree that there might be simple ways of mapping the history of humanities as part of Western knowledge more generally, why should work on ways of knowing in science, technology and medicine (STM) be one good place to start?

In this introductory section I suggest reasons why my approach might help with this wider remit, beginning with the openness of the method as to subject matter. I then discuss questions of chronology, of theory and practice, and about combinations of ways of knowing, across that wider range. I do not attempt to define the history of humanities, any more than I have delimited the history of STM. Rather, I follow an open-ended method which may in fact serve for most of the formalized knowledges of the West since the Renaissance. Later in the essay I test that proposition by sketching a history across that range, including both natural and cultural knowledge practices. Importantly, I note ways in which issues in the history of humanities may improve our histories of STM. Questions about the ultimate scope of the approach, and of what may lie beyond, I leave for another day!
Ways of knowing in STM and beyond

Though my book was called a history of science, technology and medicine, the approach was never defined by its sphere of application; indeed the book included some notes on social and cultural sciences. The same is true for each of my ways of knowing and ways of working taken individually as ‘elements’ of historical analysis. In brief, these are: reading and using meanings; describing/classifying and crafting; analysis (whether mathematical or substantive) and rationalization; and synthesis from elements. With but one partial exception, these ‘working knowledges’ seem applicable to the humanities, at least if we allow that mathematical analysis is similar to, or a class of, formal analysis, such as used in linguistics. We can show this by considering in turn these four kinds of working knowledges:

(A) The applicability is especially obvious for ‘hermeneutics’, or readings for meaning, along with its practical correlate that I provisionally called rhetoric. As an aspect of the history of STM, the reading of natural objects for meaning may be seem debatable, but reading texts for their meanings has always been central to the humanities. It is, indeed, against concerns with literary texts that historians can best consider later readings of the book of nature.

One already begins to see how including the history of the humanities might enrich the whole project. Perhaps, for example, we need to enquire how natural philosophy worked when it was no longer on the syllabus of ‘science’ teachers; or how classical humanities, modern languages, academic philosophy and art continue to inform our response to the world and our self-fashioning, as well as the factual content of our learning.

(B) I have used the term ‘extended natural history’ for projects that describe and/or classify any kind of object – and that must surely include books. The choice of terms is difficult: I have sometime used ‘sorting’ as less associated with birds’ eggs and flowers. The term ‘cataloguing’ would stress the connection with bibliography, etc., and especially in a restaurant in Greece, ‘catalogue’ would lead directly to the menu – and maybe to recipes, which in turn bridge nicely from classification to crafting. Perhaps, however, as we widen the agenda and stay with Greek, teuch is a better term than craft – one which can cover all knowledge-based creative practices, including the literary or political.

It is no accident, that here and elsewhere in this discussion, we meet with Aristotle, the greatest of Western systematisers and the widest in range. Perhaps recent historians of technology are too ready to focus on machines; better, with Aristotle, to include the biological and psychological as we consider ways of working that depend on knowledge of materials, tools, designs, and the needs of users.
(C) My third primary way of knowing is ‘analysis’, meaning reduction of a complex phenomenon to known elements – whether mathematical, as in planetary astronomy, or substantive, as in chemical analysis. Equally, and evidently, it can characterise work in literary studies, philology or psychoanalysis, for example. Here too it seems useful to distinguish formal analyses, which tend to be very general, e.g., questions of symmetry, and substantive analysis which is more field specific, e.g., the elements of the Freudian psyche.

(D) In the early papers and the book, I used ‘experimentalism’ as a fourth way of knowing and working, to stress the experimental creation of systems out of known elements, especially from the nineteenth century, whether in synthetic chemistry or the experimental medicine of Claude Bernard. But this usage was problematic because I also needed to distinguish several other kinds of experimental interventions, e.g., experimental histories (a Baconian class) and experimental analysis. More recently I have used the term ‘synthesis’ to include both mathematical modeling and novel material constructions – made from known ‘elements’, whether radicals in organic chemistry or, say, endocrine glands and hormones in clinical physiology. This aspect of the model is certainly suggestive for the humanities, and I have indicated elsewhere how the analysis: synthesis distinction may prove useful in characterising ‘modernism’ – in the arts and in STM.4

This use of ‘synthesis’ also frees ‘experiment’ to qualify the primary working knowledges – to indicate interventions (or maybe the open-ended) across the whole range of knowledge practices.

**Chronologies across the knowledge practices**

Most overviews of natural sciences hinge in the mid-seventeenth century, with the first scientific revolution; but many historians of STM stress major changes in the several decades around 1800, sometimes called the second scientific revolution, though there is little systematic exploration of its structure and dynamics, beyond individual disciplines. If we look to other kinds of knowledge practices, it is this second period, say 1776–1848, which seems especially prominent and pregnant. Historians of technology and medicine both tend to prioritise shifts around 1800 – the Industrial Revolution and the Birth of the Clinic – without neglecting others. That has indeed been my frame for my analysis of STM generally, stressing the second scientific revolution along with the industrial and the clinical. It corresponds easily with the history of humanities, for most modern social sciences are commonly dated to the half century around 1800, as are key shifts in studies of language and art, along with the Kantian and Romantic revo-
olutions in philosophy and art. If we agree that all these revolutions in knowledge practices are roughly coincident, then analysis of this complex mega-revolution and its relations with political revolutions is surely a central task for any historian prepared to work on that scale; and any analysis which has proved plausible for STM in this period would seem likely to assist that wider endeavor.

Theory and practice in STM and cultural work

Many historians of the natural sciences now see themselves as also dealing with the history of technology, while historians of medicine rarely make any primary division between science and technology. They know the nineteenth-century supposition that practices stem from prior formal knowledge, but they also know, and can use even for later periods, the old model that ‘sciences’ were the inclusions of formal knowledge, as it were, in liberal practices. Perhaps across the whole range of what the Greeks called *techne* – from medicine to playwriting – we might try to recreate the knowledges at work, the ‘sciences’ in the arts and crafts, including (fine) art, along with the philosophies which helped place those arts in both natural and cultural worlds?

Perhaps in our world as well as Aristotle’s, the sciences of languages, literature and of art might usefully be considered, in part, as technical sciences, akin to engineering sciences or some medical science – as studies of artifacts and/or modifications of nature. Thinking of technical sciences in this way may nicely approximate Bacon’s claim that making is the test of our natural knowledge and Vico’s subsequent, and perhaps consequent, claim that culture is more knowable than nature because it is man-made. Of course, in all such cases, the knowledge deployed by makers or analysts will not exhaust the properties of the artifact or the possibilities for improvement. It is importantly untrue that man-made objects are ipso facto fully understood: Victorian steam engines and novels were, and may remain, important objects of investigation – in natural sciences and in the humanities.

Here we may also note that technical sciences are often, but not always, normative. Practitioners usually want to know how they can do things better – whether they are doctors, engineers, orators or painters. For the sciences of culture, we know that normativity was crucial in the early modern period; some of them, e.g., art history, seem to have been relativized in the Age of Revolutions (so any remaining norms became local to particular artistic projects rather than general). These complex issues of praxis, technical science and normative need much more discussion than is possible in this essay; here I simply suggest that putting the sciences of culture (back) alongside wide views of medicine, engineering or agri-
culture may bring advantages across the board. Medicine, as a well-studied and partly discursive art, may be especially useful as a common point of reference, not least because our bodies and our languages are each, in various measures, both inherited and created.

Changes and combinations of knowledge practices

As noted, the kinds of ways of knowing and working which I used for analysis in the history of STM are reading/rhetoric, sorting/crafting, analysis/rationalization, and synthesis. Of course, practices of each kind were not static over time. The work of sorting in a Renaissance museum was vastly different from that in a present-day text bank, but there are enough commonalities and continuities across time to make the category stable. Changes within each ‘way’ are a significant part of history, but so too are new discriminations and combinations. In my view most knowledge projects are combinations of ‘ways’. This is hugely important, because it allows infinite variety and subtlety of analysis, perhaps more so than in the historiography which uses ‘style’. Most of the work of Alistair Crombie or Ian Hacking, for example, traces particular styles through history, simply mentioning the possibility of combinations. My approach is analytical rather than simply taxonomic – more like chemistry than botany – and thus more open-ended in the treatment of any ‘case’ (at any level).

Certainly one can follow each kind of working knowledge, and their mixtures, but their interactions and ‘compoundings’ are central. For example, all syntheses depended, and in some sense incorporated prior analyses, which in turn involved prior sortings; and all projects (and their objects) have cultural and symbolic aspects. It follows from this last statement that projects which present ‘natural’ objects involve the cultural work of ‘naturalization’ which strips particular objects of their symbolical significance, for the purposes of that project. These relationships probably hold across the whole field of knowledge. We can, for example, read a book for its meaning, to check changes between editions, or to analyze sentence structure, and these activities are likely to have different histories. This essay will stress diachronic variety, interactions and compoundings across the whole range of knowledge – in ways which seem to link easily with the complexities of social history.

Again medicine is a good guide. A disease may be seen as a viral disturbance which doctors (and historians) can analyze into natural-historical and cultural components; they may see laboratory analysis added, at least after 1800; and more recently, say, genetic engineering. All these elaborations involve new cultural resonances. But common accounts of disease may be more simply understood as ‘bio-
graphical’ – a term which covers both cultural and natural components. Thinking of biography can then connect medicine with the many other cultural disciplines and practices which study human conditions, goals and actions; and if we wish, these too can be similarly deconstructed for the purposes of analysis.

In what follows, I focus first on the dialectics of naturalization, disenchantment or objectification, and mention those of mathematical analysis. I look at the relations of reading, sorting and calculating, beginning with the early modern hierarchies of knowledge practices. I then focus on the decades around 1800 and the dynamics of analysis and rationalization, of ‘reduction’ and ‘holism’ that were central to the politics of patients, factories or literary analysis. Here I touch on the political revolutions and the roles (especially in the humanities) of new analytical disciplines which were substantive as well as mathematical. I conclude by sketching some late-nineteenth-century formations, and then skipping toward our present.

Of course, in so short a paper one can only make patchy notes, but hopefully in a way which will map important historical and logical relations. By standing far back from the disciplines we study, we may glimpse an historical overview of Western knowledge – one that might also be useful for students and historians based in other academic traditions.

The early modern conjunctures:
Meanings, sortings, and calculations

It is not easy to focus on reading meanings as a way of knowing, for it is to academics as swimming is to fish; but historical scholarship on early modern reading, writing and teaching comes to our aid. In a lovely summary, Anthony Grafton focuses on the teaching of classical texts, usually Aristotle – on the line-by-line presentation, the oral commentary, and the printed editions which left room for intertextual notes. This was the infrastructure for the high-level transmission of classical cosmologies – of philosophy and its various extensions in the professional education of theologians, physicians and lawyers whose main business was speaking and writing in that frame. This may seem a world away from ours, and of course, the methods and infrastructure have changed, but when we learn subjects new to us we usually read for the meaning, not to study the author; and all such learning may shape us as actors, not just as critics. Outside of religious education, we now are rarely taught cosmologies directly, but as historians we might attend more to how modern cosmologies are transmitted; and why some champions of the humanities continue to promote the role of humanities in self-creation.
Professional education was also underpinned by the seven liberal arts, the *quadrivium* and the *trivium*. The former, including geometry, arithmetic, astronomy and music, provided mathematical literacy and an appreciation of regularities; we will return to them in discussing the development of mixed mathematics as mathematical analysis of nature and of artifacts. The latter, comprising grammar, logic and rhetoric, might also be said to deal in formal or substantive analysis, but as the basics of reading, writing, speaking and argument – the arts of discourse. As in all the liberal arts, the emphasis could be on the analysis of structures, or on norms and the improvement of practice and of character – as in renaissance rhetoric.

But as we have already suggested, there were other activities also ancillary to reading for meaning. Texts were collected and compared, catalogued and indexed; and so were words and quotations, along with the notes that scholars had made. One had to work out what was likely to be the ‘best’ text – not necessarily the most meaningful but the one which appeared less infected by successive copying errors or mistranslations. From classical libraries to modern databases, texts of many kinds have been assessed and prepared for use, sometimes using formal analyses.

It seems that the arts of bibliography, etc., were in some ways prior to the arts of cataloguing developed for natural and other technical objects; there was clearly a parallel, at least, between the searching out of new texts and the collecting of new plants. We know that in medicine, natural history and astronomy, textual criticism was then the basis for increasing reference to the ‘book of nature’: that corpses, for example, were used to illustrate readings of Galen, to ask questions about alternative readings, and then to question the veracity of the classical source – so that modern anatomy books were written to replace the classical (and to be taught and learned from, with more or less reference to corpses). Essentially the same story has been well-told for Dioscorides and botany, and for Pliny and natural history: commentaries on classical but perhaps marginal writers gave way to texts based on collections and observations of specimens.

Partly because many of the new specimens did not ‘come with culture’, would-be botanists learned how to ‘objectify’, as anatomist learned to explore the body as if a new land. This naturalization and objectification is a key feature of Western knowledge, for objects and for texts, but in thinking across the whole range of Western knowledge we should always be aware that objectification is a process, and reversible. Birth monsters are never securely ‘naturalized’, even for technicians; recent Western museum displays often render ethnography as art, or natural history as culture; and the word-world of Google is wonderfully undisciplined.
Information about bodies or plants was compiled in *historia*, a new genre which extended across most of knowledge. It could include the findings of crafts or systematic observation of weather, diseases or planetary motions; or legal cases and other historical documents. Historia literaria, of course, included classical texts and commentaries, whether they were still the foundation of didactic education or of decreasing direct interest within ‘modern’ fields.

One can give a similar account of the relations between texts, meanings and quantitative analysis in astronomy. Kepler was philologist enough to be able to judge the quality of texts, and he could help date texts by calculating the year of occurrences mentioned therein. He could also debate the relative merits of various classical and modern models of the heavens, guided by his cosmological preferences. Comparable stories can be told about mechanics and the Archimedean tradition, which, of course, interacts with astronomy through Galileo and then crucially through Newton. Mathematical analysis, in courts and universities, grew way beyond the quadrivium into a discipline often called mixed mathematics.

As most scholars seem to agree, the main frame of early modern natural knowledge was tripartite, and perhaps that model can be extended across the humanities: reading meanings continued to be central in theology and various kinds of philosophy, but the once ancillary projects of collecting information and of calculating were growing strongly and encouraging new cosmologies. The ‘scientific revolution’ can be read as shifts of world meanings based on extension and intensification of naturalization and mathematization (with some attempts to bridge them through experimental philosophy). In the humanities, in some countries, the new stress on plain speech downplayed renaissance rhetoric, and scholars attempted to understand languages by a universalist analysis, as in music. In my view this triangular interplay of meanings, information and mathematics remained the chief pattern of knowledge through much of the eighteenth century, and these kinds of working knowledges remain important to the present. Much of ‘management science’, for example, is made up of case histories, mathematics and ‘philosophies’ – as it must be.

It is, however, a mistake to imagine that the scientific disciplines of the nineteenth century were simply specializations or elaborations of these early modern practices. The new sciences built on the older knowledge, and in some ways incorporated them, but they involved new elements specific to each new science, e.g., chemical elements, geological strata or the elements of deductive political economy. The working knowledges of these new or reformed sciences were heterogeneous but predominantly analytical – both in natural sciences and technologies and in the disciplines related to languages and the fine arts.
The age of knowledge revolutions

We can begin with the history of medicine, as portrayed by Michel Foucault at the start of his career. Like most historians of medicine, he saw in post-Revolutionary Paris a new form of science, based on the analysis of bodies into tissues, each of which could show characteristic lesions. But if we look more closely we will also see the continuance of older practices, including the case histories and the medical philosophies; we will indeed see a variety of ‘compoundings’ according to the local contexts. Historiography of medicine, including the critiques aimed at Foucault, is thereby a useful model for the continuities, uneven development and contested cumulations which are crucial to a full history of any such field, including the cultural sciences. But that is not to deny the significance of new forms of knowledge and practice circa 1800 which Foucault also noted for zoology, philology and economics. 12

That significance is especially clear when we know that the tissues of Bichat’s new general anatomy were in some ways modeled on the new chemical elements of Lavoisier’s chemistry. These elements, unlike those of the ancients or early moderns, were field-specific and accessible: chemistry was the discipline which analyzed the stuffs of the world in terms of chemical elements; general anatomy analyzed bodies as composites of tissues. I have shown elsewhere how this kind of intellectual project can be traced across many new physical and biological sciences and technologies – in several varieties of anatomy and physiology of animals and plants, crystallography, comparative engineering, and in the stratigraphy of the new geology. 13 (The range of comparability is much wider than Foucault supposed when he excluded the harder sciences.) The rest of this paper sketches some ways in which the argument can be developed across the humanities and allied practices. We begin with French and British projects which claimed kinship with comparative anatomy and chemistry, before moving to ‘developmental analyses’ and to the arts and sciences of the subjective. The latter were, of course, characteristic of German universities where the hierarchies and chronologies of knowledge practices were very different from those of Parisian museums and professional schools.

Anatomies of societies and economies

In the early nineteenth century, the headquarters of comparative anatomy was the National Museum of Natural History in Paris. The dominant author was Cuvier who contrasted four different kinds of organism, each with a distinct plan; each animal was a system of interactions between organs, and each animal
interacted with features of its surroundings that thereby constituted its ‘environment’. That model reordered zoology, but there were many other ways of analyzing biological and medical organisms, most of which could also be used on social organisms. (The direction of ‘influence’ here is debatable; I am not arguing for the intellectual priority of biology.) Models included the Saint-Simonian idea of parallel functional systems, the communitarian model of similar parts acting in concert, the ‘economy’ of material interactions between differentiated parts, or the old view of a unitary soul (remade for a context in which it was no longer hegemonic). In my view, none of these approaches or scholarly fields can be fully understood in isolation from the others or from contemporary politics, nor should they be detached from the descriptive, practical or statistical ‘social sciences’, which in England at least, occupied most of the enthusiasts. Much of the more refined sociological analysis was ‘merely theoretical’; the effects in practice were chiefly through suggesting or legitimating particular modes of social action.

Perhaps only in political economy did analytical reduction then gain much empirical traction, in interactions with other kinds of working knowledge. For example, most eighteenth-century economical writings could be classed as extensions of natural philosophy, natural history or mathematics, or as normative manuals for the management of estates; and writing of these kinds continued. But in England, and especially with Ricardo, one also sees increasingly abstract, calculative models of the economy, analyzed as the interactions of ‘elements, of land, labor and capital’. According to Schabas, it was then J.S. Mill who made a strong separation between the natural sciences of agricultural or industrial production and the moral science of political economy.

This key move may perhaps be linked with then current general questions about the interrelations of the new analytical sciences. Mill was much indebted to Comte, the prime French theorist of the new configurations of science, who described a hierarchy of sciences – in which each new disciplinary layer added new understandings specific to that layer, e.g., the biologist added understandings of tissues for living bodies that also showed chemical phenomena. Comte saw social analysis as superadded to biological (and lower) analyses for any given material case; in Mill’s view, political economy as a science should confine itself to ‘the necessities caused by social arrangements’. One may see here, across the board, how questions of the organization of knowledge connected with new ontologies, including the isolation of ‘the economy’ from nature.

But all such economic analyses were so obviously disputable that the British Association for the Advancement of Science, for all its stress on analytical physical sciences, preferred that would-be economists restrict themselves to the collecting of data. Similar reactions to deductive analysis were common among Ger-
man scholars who took an interest in economics and social development. They scorned the simplifications of the British and preferred more descriptive and historical modes. Part of the issue here was the different philosophical underpinnings in the two countries, and the German focus on state rather than the civil society prized by the British; but the disputes also exemplify the characteristic tensions seen in many fields of knowledge between the ambitions of analysts and the caution of ‘naturalists’ and historians.

The centrality and range of this tension is nicely visible in the novels of George Eliot, who was closely associated both with Comteans and exponents of descriptive natural history. My point here is not to find influences of natural sciences in humanities or art, but to underline how creative intellects across many fields wrestled with the characteristic tensions of the age of analysis – between the surface appearances and the underlying agencies, between the taxonomies and the underlying relations, and between normative approaches to various arts (and their histories) versus the systematic study of difference. Novelists – as technologists if you like – presented their analyses by constructing ‘cases’ which had to be realistic, just as geologists had to reconcile stratigraphic analysis with the details of local land forms. I have suggested elsewhere how such matters may relate to important questions about ‘objectivity’.

We will return to studies of arts and art, especially in Germany, but can take here a further example from France, where mid-nineteenth-century art history was connected with comparative anatomy. After the Revolution, art had been separated from use rather literally, through the creation of museums from what were once parts or possessions of churches or palaces. In these new museums ‘art objects’ were arranged and studied historically, highlighting the classical tradition. But from the 1860s, lectures in art history were introduced as part of a reform of the École des Beaux-Arts. One of the key reformers and the first lecturer was Eugène Viollet-le-Duc, a specialist in historic architecture and reconstruction who was steeped in the morphology of Cuvier’s rival, Geoffroy Saint Hilaire. The environmental understandings of art pioneered by the positivist Hippolyte Taine was closely related to Cuvier’s analysis of animals in their contexts, as it were. In both cases, a self-consciously scientific, comparativist approach to art history was designed to undermine the classical, normative tradition of the École – at much the same time as Manet’s equally subversive explorations of different styles. Again we see how the historical study of similar problems across different working knowledges may allow the generalization of historiographical methods and resources.
Languages, analysis and history

Language studies, like ‘the medicine of the clinic’, zoology or art history, depended on collections and on the developments in the sorting/describing arts which we have already discussed, including source-criticism. Some language scholars retained a normative commitment to the betterment of language, as some anatomists focused on improving the detailed knowledge of human anatomy for use in surgery;22 other language scholars, like comparative anatomists, concentrated on comparative analysis, which here again could take several forms.

Especially in Britain, where associationist models of mind had been boosted by the success of new analytical sciences such as chemistry, it was fashionable to focus on etymology and to analyze words as ‘compounds’ which tended to be abbreviated over time. Continental scholars found this approach conjectural and instead focused on closer structural analyses of particular languages, and especially Sanskrit, comparisons with which suggested new orderings of European languages.23 In philology, as in geology, comparisons of structures and functions soon opened question of historical development. In both cases, the forms of historical enquiry which proved secure depended on detailed comparative analysis based on extensive collections and careful descriptions.24

But whereas zoologists and paleontologists usually found time-series of ascending complexity, students of language envisaged primal language as fully formed, and subject to various patterns of decay. Though academic philologists learned Sanskrit from followers of the British pioneer, William Jones, and used collections in Paris, it was in German universities that structural and historical studies of language thrived. That was partly because of the strength of the mindset called Romanticism, with its elevation of the past, but it was also because of the conditions of work and especially the idea of developing knowledge though research. Indeed, it seems clear that ‘seminars’ and cooperative studies of text collections set the pattern for the laboratories and ‘research schools’ which became the glory of German natural sciences. More specifically perhaps, the model of a tree of texts with a common root may have been the basis for later zoological phylogenies.25 One notes here an important echo of the centrality of humanities in the renaissance, and a reminder that the common image of humanities disciplines following the natural sciences may be very misleading.
A new philosophy of knowing

So far in this essay, as in my book and the work of Foucault, much of the history has been French and British. But if one wishes to include philosophy, history, and the sciences of mind and culture, or even the biological sciences of development, then Germany must be central – so too for the fine arts and their histories. Perhaps a brief outline may indicate how one may bridge the national traditions at the same time as one bridges from sciences to art.

Historians of science usually see natural philosophy declining in the nineteenth century, except for the substantial recrudescence of natural theology often regarded as a medicine for unrest in newly industrial Britain. In general, philosophical cosmologies seem to be replaced with theories of scientific method – which had a history in Britain. Neither in Britain nor France was there much \textit{endogenous} change in philosophy, which tended to remain associationist. But in German states, where philosophy became a key academic discipline, a new world of knowledge was created around a new view of mind – not as a sorter and aggregator of sensations, but as a source of schema through which the world was understandable. These included principles constitutive of all knowledge and some constitutive of particular fields, e.g., the appreciation of biological systems as teleological, or the recognition of polarities and patterns in nature. It was natural to see individuals, organisms and states as developing – as our knowledge of them also developed – hence the centrality of historical approaches in all fields. Art was central because it could directly express the mind’s responses. This new philosophy of mind and nature restructured German disciplines, including those constructed with some reference to new French analyses.

Characteristically these German disciplines were gathered in faculties of philosophy, by teachers who prized their new independence from the professional faculties, and their disciplines were presented as sciences that could be applied, rather than the knowledge contents of professional arts. Certainly, in some ways, the German approach can be seen as anti-analytical: the new legal studies, for example, celebrated the historical development of law in opposition to French codifications which were seen as intellectual conceits. Most Romantics saw ‘dissection’ as destructive, and instead sought unities beneath variety, as in the cell theory which pointed to a common mode of origin of different kinds of cells and tissues; or they composed particulars into larger entities which could be seen as systemic – e.g., the Humboldtian cosmos. But these views were not just an extension of older approaches, they were new; and if we compare these new forms of knowledge with natural history or with the older natural philosophies, they can be seen as an alternative form of modernity, one which cannot be dismissed as merely descrip-
It stressed the recurrence of simple patterns and especially the unfolding of underlying forms – and in that extended sense can, I think, fairly be described as analytical. We may thereby usefully broaden that term and its range; and we can begin to explore the issues by looking at German historiography.

This same concern with development which we have noted in German biology was evident, earlier, in the study of human history. Historiography depended, of course, on the developing arts of sorting and description, but also on new conceptual objects, notably the nation, and on newish ‘actors’ such as the common (Germanic) people. Later in the nineteenth century the study of history often became normative as well as analytic, not just for the betterment of political skills or diplomacy – the universal justification of the classical humanities – but to improve the health and strength of the nation.27

But the new history was also analytical in other ways, related to the concern with ideas. To read meanings correctly was no longer a simple task: accurate reading required knowing the whole system of which the text or action was a part. As is well-known, this view came from Vico in early-eighteenth-century Naples: ‘understanding’ became less a matter of correspondence with nature, and more a question of recreating perspectives. This scientific but nonnaturalistic approach to ‘ideas’ grew chiefly in nineteenth-century Germany where philosophy attained a new centrality alongside the history of culture and of the state.

Readings, however, also depended on the empathy of historians, who needed to internalize the societal context and rules, adding them to their own cultural understandings and repertoires. In this respect, historians claimed similarity to artists, both in registering the likely feelings of their actors and in skillfully depicting the reconstructed scenes and sequences.28 In as much as sciences could focus on ideas, there could be new introspective psychologies29; in as much as art now had new goals, it could be understood as a historical development characteristic of a new setting which was peculiarly Germanic. That outlook helped create German art history, especially when academics far from the major art collections could use that emblematic comparative device, the slide projector – or preferably two.30

The decline of national difference and the challenge of natural sciences

Through the first half of the nineteenth century, analytical science and Romantic art were held together in Germany by a common focus on the analysis of mind and history, and by the fact that the many new disciplines cohabited in reformed universities, sharing ideologies of Bildung and research. We have seen how they were characterized by new analytical formations which stressed development and
resisted French and British reductions, as they were also related to older disciplinary practices and professional education. But by about 1850, the great constructive period of German philosophy seemed to be over; thereafter, national differences in method diminished, even as Germany became the leading site for natural, human and cultural sciences.\(^\text{31}\) Such then were the strengths of German universities in both philosophy of mind and experimental physiology that they led the world in forms of psychology in which experimental and subjective analyses were variously opposed or compounded. Such psychologies were increasingly felt to threaten the place of philosophy and of history as the core of humanities.\(^\text{32}\)

Philosophy as a discipline came in part to reflect on the successes and the relations of the natural sciences; in part it became analysis of past philosophical positions, especially German. In this latter respect it was convergent with other historical disciplines which countered the astonishing growth of natural sciences by stressing Verstehen as a method, and uniqueness as a supposed peculiarity of cultural systems.\(^\text{33}\) In many countries idealism continued to serve as a secular philosophy of societal progress (for others it could be Spencerism); thus meaning was preserved alongside the classificatory and calculative arts; but the frontier of knowledge was now made up of analytical sciences – some of which claimed to be distinctively cultural.

While German philosophers of history appealed to the re-creative analysis of ideas as distinguishing the realm of Geisteswissenschaften, roughly corresponding to later ‘cultural studies’, most academic promoters of history in Britain seemed happy to imitate the research schools of their colleagues in the natural sciences. Few British humanists worried publicly about the differences between academic sciences and arts – at least until the expansion of academic sciences after World War II, when some teachers of English had moved away from philology and saw their subject as a successor to classical humanities in upholding cultural values. In their case it was values evident in early modern Britain, long undermined by industrialization and now threatened by the pretensions of some scientists.\(^\text{34}\) The ensuing battle remains as the familiar question of ‘two cultures’ – an opposition better analyzed than assumed, as this essay may suggest. We may thus conclude by skipping to other present-day configurations – as seen across the two cultures.

**Coda**

Perhaps the indulgent reader may have found here enough useful frames and connections to mitigate the obvious charge of simplification across too wide a canvas. I have stressed continuities as well as reconfigurations, and the complexities within disciplines as well as the relations and the connections between them. These
relationships between different kinds of knowledge practices operated at many levels – for micro-histories and macro-histories need not be different in kind. To analyze a small case is to reconstruct the interactions over time of differing socio-cognitive traditions and thus to begin to see a larger picture, incorporating many such interactions. In such ways we can hope to work across levels and across fields which are usually considered separately.

In later work, *deo volente*, I hope to extend and deepen this sketch, and to bring it up to the present. But I wanted here to sketch a method and a historical frame which can include both the early modern triad and the nineteenth-century analytical additions – for humanities and social sciences/technologies as well as natural sciences and technologies.

Nowadays, across the world, governments and companies fund massive enterprises for sorting and describing – for objects, patents, texts and data; and for mathematical analysis. These now coexist with, and are partly reformulated by, new analytical sciences, as also with various forms of synthesis. All are found across the natural and social sciences and technologies, but also in the cultural sciences and humanities. They afford a huge challenge to historians, who must also include issues of shared meanings – of our changing relationships with the physical world and with each other.

We can illustrate that last point by again returning to history of medicine. Discursive arts and cultural meanings were central to its high-status early modern practice, and in some ways they remain so; discussions of how to live and die remain the core of our ‘philosophies’ – medical and humanistic. In modern medicine, at the limits of astonishing material technologies we still return to issues of life and death, and to sharing our readings of the world and ourselves. As a huge medico-biographical literature – professional and amateur, printed and electronic, primary and secondary – now demonstrates, humans always need more than the technicalities; they need more than the naturalized, the analyzed and the synthesized. That is also true, and vital, for the humanities.

One may here note the still-sharp barb directed a century ago at Germanophile modernisers of the Sorbonne. The *Étude* in which students had read the classics had become the *Laboratoire de philologie française*, where bibliography now reigned; the Sorbonne was coming to resemble a restaurant in which the only thing to eat was the menu! We need histories that will show how the whole range of technical knowledges were successively generated and used – but ones which can also widen our appreciation of other crucial forms of ‘philosophical’ understanding and practice, including self-creation.
Notes


2 I am very grateful to the Descartes Centre at the University of Utrecht for the invitation to lecture, for a fellowship in Autumn 2012, and for introducing me to many scholars of the history of the humanities, notably Rens Bod, whose kind help included the advance use of his *A New History of the Humanities: The Search for Principles and Patterns from Antiquity to the Present* (Oxford: Oxford University Press, 2013). My thanks also to Jonathan Harwood, John Christie and Helen Small for reading a draft, and also to Ludmilla Jordanova, David Lomas, and Bart Karstens for suggestions. For reasons of length the notes on this preliminary essay are minimal – but they mention some wonderful books.


5 See, for example, Ian Hacking, ‘Style for Historians and Philosophers,’ *Studies in History and Philosophy* 23 (1992), 1-20.


11 See H. Floris Cohen, *How Modern Science Came into the World* (Amsterdam: Amsterdam University Press, 2007), 723. I thank Floris for discussion of this point.


For summaries and references, see Pickstone, *Ways of Knowing*, 125-129.


Rudwick has published exemplary accounts of how natural philosophy and natural history (including antiquarianism) were displaced (NOT replaced) by structural analyses of animals and rock formations – which were later made historical. Martin J.S. Rudwick, *Bursting the Limits of Time: The Reconstruction of Geology and the Age of Revolution* (Chicago: University of Chicago Press, 2005), and *Worlds before Adam: The Reconstruction of Geohistory in the Age of Reform* (Chicago: University of Chicago Press, 2008).


E.g., see Iggers, *German Conception*, 111.


